

What is claimed is:

1. A front end module for processing transmission signals and reception signals of a time division multiple access system and transmission signals and reception signals of a code division multiple access system, the front end module comprising:

a first separating means connected to an antenna and separating the transmission signals and the reception signals of the time division multiple access system from the transmission signals and the reception signals of the code division multiple access system;

a second separating means connected to the first separating means and separating the transmission signals of the time division multiple access system from the reception signals of the time division multiple access system;

a duplexer connected to the first separating means, including two acoustic wave elements each of which functions as a filter, and separating the transmission signals of the code division multiple access system from the reception signals of the code division multiple access system; and

a single multi-layer substrate for integrating the first separating means, the second separating means and the duplexer.

2. The front end module according to claim 1, further comprising:

a filter connected to the second separating means and allowing the transmission signals of the time division multiple access system to pass through this filter;

a filter connected to the second separating means and allowing the reception signals of the time division multiple access system to pass through this filter; and

a filter connected to the duplexer and allowing the reception signals of the code division multiple access system to pass through this filter, wherein the multi-layer substrate is used to further integrate the filters.

5 3. The front end module according to claim 1, further comprising a power amplifier for amplifying the transmission signals of the time division multiple access system and a power amplifier for amplifying the transmission signals of the code division multiple access system, wherein
10 the multi-layer substrate is used to further integrate the power amplifiers.

 4. The front end module according to claim 1, further comprising the antenna, wherein the multi-layer substrate is used to further integrate the antenna.
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 5. The front end module according to claim 1, wherein: the duplexer incorporates a chip or two chips including the acoustic wave elements and a mounting board on which the chip or chips are mounted; the mounting board includes components of the duplexer except the acoustic wave elements; and
20 the duplexer is mounted on the multi-layer substrate.

 6. The front end module according to claim 1, wherein the duplexer incorporates a chip or two chips including the acoustic wave elements and mounted on the multi-layer substrate, and the multi-layer substrate includes
25 components of the duplexer except the acoustic wave elements.

7. The front end module according to claim 1, wherein: the duplexer incorporates a chip or two chips including the acoustic wave elements and a mounting board or two mounting boards on which the chip or chips are mounted; the chip or chips and the mounting board or boards are mounted on the multi-layer substrate; and the multi-layer substrate includes components of the duplexer except the acoustic wave elements.

8. A front end module for processing first transmission signals and first reception signals of a time division multiple access system included in a first frequency band, second transmission signals and second reception signals of a time division multiple access system included in a second frequency band, and third transmission signals and third reception signals of a code division multiple access system included in a third frequency band, the front end module comprising:

15 a first separating means connected to an antenna and separating the first transmission signals and the first reception signals, the second transmission signals and the second reception signals, and the third transmission signals and the third reception signals from one another;

a second separating means connected to the first separating means and separating the first transmission signals from the first reception signals;

a third separating means connected to the first separating means and separating the second transmission signals from the second reception signals;

a duplexer connected to the first separating means, including two acoustic wave elements each of which functions as a filter, and separating the third transmission signals from the third reception signals; and

a single multi-layer substrate for integrating the first separating means,

the second separating means, the third separating means and the duplexer.

9. The front end module according to claim 8, further comprising:

5 a filter connected to the second separating means and allowing the first transmission signals to pass through this filter;

a filter connected to the second separating means and allowing the first reception signals to pass through this filter;

a filter connected to the third separating means and allowing the second transmission signals to pass through this filter;

10 a filter connected to the third separating means and allowing the second reception signals to pass through this filter; and

a filter connected to the duplexer and allowing the third reception signals to pass through this filter, wherein

15 the multi-layer substrate is used to further integrate the filters.

10. The front end module according to claim 8, further comprising a power amplifier for amplifying the first transmission signals, a power amplifier for amplifying the second transmission signals, and a power amplifier for amplifying the third transmission signals, wherein

20 the multi-layer substrate is used to further integrate the power amplifiers.

11. The front end module according to claim 8, further comprising the antenna, wherein the multi-layer substrate is used to further integrate the
25 antenna.

12. The front end module according to claim 8, wherein: the duplexer incorporates a chip or two chips including the acoustic wave elements and a mounting board on which the chip or chips are mounted; the mounting board includes components of the duplexer except the acoustic wave elements; and
5 the duplexer is mounted on the multi-layer substrate.

13. The front end module according to claim 8, wherein the duplexer incorporates a chip or two chips including the acoustic wave elements and mounted on the multi-layer substrate, and the multi-layer substrate includes
10 components of the duplexer except the acoustic wave elements.

14. The front end module according to claim 8, wherein: the duplexer incorporates a chip or two chips including the acoustic wave elements and a mounting board or two mounting boards on which the chip or chips are
15 mounted; the chip or chips and the mounting board or boards are mounted on the multi-layer substrate; and the multi-layer substrate includes components of the duplexer except the acoustic wave elements.

15. A front end module for processing first transmission signals and
20 first reception signals of a time division multiple access system included in a first frequency band, second transmission signals and second reception signals of a time division multiple access system included in a second frequency band, third transmission signals and third reception signals of a code division multiple access system included in a third frequency band, and
25 fourth transmission signals and fourth reception signals of a code division multiple access system included in a fourth frequency band, the front end

module comprising:

a first separating means connected to an antenna and separating the first transmission signals and the first reception signals, the second transmission signals and the second reception signals, the third transmission
5 signals and the third reception signals, and the fourth transmission signals and the fourth reception signals from one another;

a second separating means connected to the first separating means and separating the first transmission signals from the first reception signals;

a third separating means connected to the first separating means and
10 separating the second transmission signals from the second reception signals;

a first duplexer connected to the first separating means, including two first acoustic wave elements each of which functions as a filter, and separating the third transmission signals from the third reception signals;

a second duplexer connected to the first separating means, including
15 two second acoustic wave elements each of which functions as a filter, and separating the fourth transmission signals from the fourth reception signals;
and

a single multi-layer substrate for integrating the first separating means, the second separating means, the third separating means, the first duplexer
20 and the second duplexer.

16. The front end module according to claim 15, further comprising:

a filter connected to the second separating means and allowing the first transmission signals to pass through this filter;

25 a filter connected to the second separating means and allowing the first reception signals to pass through this filter;

a filter connected to the third separating means and allowing the second transmission signals to pass through this filter;

a filter connected to the third separating means and allowing the second reception signals to pass through this filter;

5 a filter connected to the first duplexer and allowing the third reception signals to pass through this filter; and

a filter connected to the second duplexer and allowing the fourth reception signals to pass through this filter, wherein

the multi-layer substrate is used to further integrate the filters.

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17. The front end module according to claim 15, further comprising: a power amplifier for amplifying the first transmission signals; a power amplifier for amplifying the second transmission signals; a power amplifier for amplifying the third transmission signals; and a power amplifier for
15 amplifying the fourth transmission signals, wherein

the multi-layer substrate is used to further integrate the power amplifiers.

18. The front end module according to claim 15, further comprising the
20 antenna, wherein the multi-layer substrate is used to further integrate the antenna.

19. The front end module according to claim 15, wherein:

the first duplexer incorporates a first chip or two first chips including
25 the first acoustic wave elements and a first mounting board on which the first chip or chips are mounted, and the first mounting board includes components

of the first duplexer except the first acoustic wave elements;

the second duplexer incorporates a second chip or two second chips including the second acoustic wave elements and a second mounting board on which the second chip or chips are mounted, and the second mounting board
5 includes components of the second duplexer except the second acoustic wave elements; and

the first and second duplexers are mounted on the multi-layer substrate.

10 20. The front end module according to claim 15, wherein:

the first duplexer incorporates a first chip or two first chips including the first acoustic wave elements and mounted on the multi-layer substrate;

the second duplexer incorporates a second chip or two second chips including the second acoustic wave elements and mounted on the multi-layer
15 substrate; and

the multi-layer substrate includes components of the first duplexer except the first acoustic wave elements and components of the second duplexer except the second acoustic wave elements.

20 21. The front end module according to claim 15, wherein:

the first duplexer incorporates a first chip or two first chips including the first acoustic wave elements and a first mounting board or two first mounting boards on which the first chip or chips are mounted, and the first chip or chips and the first mounting board or boards are mounted on the
25 multi-layer substrate;

the second duplexer incorporates a second chip or two second chips

including the second acoustic wave elements and a second mounting board or two second mounting boards on which the second chip or chips are mounted, and the second chip or chips and the second mounting board or boards are mounted on the multi-layer substrate; and

- 5 the multi-layer substrate includes components of the first duplexer except the first acoustic wave elements and components of the second duplexer except the second acoustic wave elements.

22. A high frequency functional module comprising:

- 10 a duplexer including two acoustic wave elements each of which functions as a filter, and separating transmission signals from reception signals; and

 a single multi-layer substrate for integrating the duplexer, wherein:
 the duplexer incorporates a chip or two chips including the acoustic

- 15 wave elements and mounted on the multi-layer substrate; and

 the multi-layer substrate includes at least part of components of the duplexer except the acoustic wave elements, and/or at least part of a circuit connected to the duplexer.

- 20 23. A high frequency functional module comprising:

 a duplexer including two acoustic wave elements each of which functions as a filter, and separating transmission signals from reception signals; and

 a single multi-layer substrate for integrating the duplexer, wherein:

- 25 the duplexer incorporates a chip or two chips including the acoustic wave elements and a mounting board or two mounting boards on which the

chip or chips are mounted;

the chip or chips and the mounting board or boards are mounted on the multi-layer substrate; and

the multi-layer substrate includes at least part of components of the
5 duplexer except the acoustic wave elements, and/or at least part of a circuit
connected to the duplexer.